Original Article

Free throw and outcomes: Pilot study on intensive training versus extensive one

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ABSTRACT

Free throw is a fundamental of the basketball that can be trained under the same match conditions, as there is no interference of the defense in the attempt to make a point. It is a fundamental that theoretically has the highest degree of efficiency, so it is useful to know which specific training method allows the best possible performance. The aim of the present study is to evaluate the difference in yields (results) on free throws in basketball through the intensive and extensive training method. The method is experimental and the study was conducted on a sample of 24 male athletes (10-12 years) divided into two experimental groups of 12 young athletes each. To them it was assigned of the free throw motor task by the regulatory position. Participants were initiated at learn the new motor task, using two different training methods: intensive method with the same number of throws in a period of 3 days a week and extensive method with the same number of throws in a period of dual time. Each group done 2280 throws per week for four weeks. Group A has conducted training on days six consecutive weekly, while Group B on days three consecutive weekly. They have been collected data of the throws realized individual and of group. The result for Group A (extensive training) resulted in an increase the performance by 8.53%. The result for Group B (intensive training) resulted in an increase the performance lower than Group A and was 3.21%. Group A had a steady increase in performance over the four weeks, while Group B have had a limited improvement in performance. The final percentage difference between the two groups has been 5.23%. Improvement of the B Group, with Intensive Training, in the four weeks of the learning period it has been less congruous than the one with the extensive training of Group A. After the first week, the results show the absence of significant differences between the two groups p-value = 0.257 (p> 0.05); instead, after four weeks, the results show a significant

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difference between the two samples p-value = 0.01 ($p < 0.05$). Finally, from results appeared that extensive practice, in the realization of effective and consolidated motor learning, must be based on careful time distribution of the exercises and with a high number of repetitions in order to obtain high precision and an elevated stability of the performance. **Key words:** MOTOR LEARNING, SKILL, TRAINING, INTENSIVE PROGRAMME, EXTENSIVE PROGRAMME.

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INTRODUCTION

Practicing regular physical activity produces health benefits (D'Isanto et al, 2017, Gaetano, 2016), which increase if it is started at a young age even with the support of pedagogic paradigms (D'Isanto, 2016, Gaetano, 2012), in general terms and of physical well-being (Altavilla & Di Tore, 2016). In the field of education and physical and sports it is essential to identify methodologies that facilitate participation in adequate quantity and in terms of learning. Sports activities such as basketball include all the educational and training features required for the development of young athletes. In this sport activity there are so many rules and so many physical, technical, and tactical skills to master, such as the use of the feint (Raiola, 2015) to have advantage on the adversary who then must be hold maintained and realized in a positive result, making a realization (Altavilla & Raiola, 2015). In the basketball game, the throw represents the main offensive action of a team (Raiola et al., 2016). The main objective of each basketball player during the match is to score points, he can do it perform a jump shot, set shot, layup or a free throw (Struzik et al, 2014). Free throw shooting is a vital skill in the game of basketball and represents about 19-25% of the points in a match (Sampaio e Janiera, 2003); therefore, a fifth to a fourth of points scored in basketball games come from the free throw line. In this study, it will be analized the free throw from the point of view of effectiveness, in relation to two different methodological approaches (intensive and extensive practice). The free throw can be considered as a standardized performance task because the shooter has full control of his "stereotyped" movement, other players are not allowed to interfere and the environment is not variable (Mascret et al, 2016). Free throw is a fundamental to performance, because it is capable to influence the final result of many matches, especially those where the score has a minimum gap and even a single free throw can make a difference. In addition, it can be trained under the same conditions of the match as there is no interference of the defense; therefore it is a fundamental that theoretically has the highest degree of yield. Making free throws with high percentages means having tremendous guarantees for the ultimate victory; as well as creating in own players a positive psychological aspect, greater self-esteem, gratification and sense of technical superiority (Raiola & D'Isanto, 2016). The aptitude to acquire new motor skills is defined as the ability of motor learning that through exercise achieves a high degree of stability, precision and efficiency (Petracovschi, 2012). This process starts with first incorrect, clumsy and slow attempts, over basic structures acquisition, to superior performance of skills in different circumstances (Čuljak et al.,2014). When an individual learns a new movement or skill you can notice how the execution of these movements is wrong or inaccurate (Altavilla et al., 2013), then you need to work with effective methods. There are different theories on what should be taken into consideration on designing a motor program (Adams, 1971; Schmidt and Wrisberg, 2000); however, task duration and structure definitely are crucial characteristics that influence the process (Delaš et al, 2008). The number of repetitions of the new skill represents a basic element in reinforcing and creating the motor model (Schmidt, 1975). The effectiveness and efficiency of overall practice, interpreted as the number of repetitions, has been long recognized as the foundation of learning and perfecting movements (Lee & Genovese, 1988). A high level of motor coordination presupposes the correct execution of the motor gesture and the ability to modify it and adapt it to the situation while maintaining the effectiveness (Altavilla & Raiola, 2014). The experience and learning go hand in hand with the change in organic and evolutionary, being essential for the adaptation to the environment (Gaetano et al, 2014). According to the ecological approach "to learn" means being able to progressively find the best motor solution for a given task in a given context (Raiola & Di Tore, 2017). Teaching strategies, to enhance learning, have to stimulate the emergence of spontaneous solutions to motor, problems (Di Tore et al, 2016).

The purpose of the study is to evaluate the difference in yield on free throws through the intensive and extensive training method. Intensive training concentrates the repetitions in a limited time (half) of that extensive and remaining the number of repetitions unchanged. Determining which methodology is most effective for motor learning means allowing coaches to schedule workouts so that they can have a positive impact on performance (Raiola, 2014) and therefore on the final outcome of each match.

METHODS AND MATERIALS

The study method is experimental with the division of the sample in 2 groups: A and B. Group A has been trained with the intensive method, while B with the extensive method, distributing the amount of the workloads (Bompa & Buzzichelli, 2016). For an adequate training planning is necessary an optimal modulation of the loads (Gaetano & Rago, 2014), that is predicting the volume of the workload, the density of the workload and the intensity of the workload in training (Bompa,1999), to determine the adapting in the young athletes to the training program (Rago et al, 2016). Furthermore, the structure of the training process in long and short steps facilitates the achievement of maximum sport performance, without underestimating the multifactorial nature of performance (Rago et al, 2017). The motor task required for the children foresee a free throw with a minibasket ball (weight about 500 gr.) On a minibasket placed at a height of 2.60 mt. No indication has been given on the limb from to use or if pull the ball with both limbs.

The training included 2280 throws to basket from the line of the free throw for each group weekly, for a four-week period. The groups performed the training in the following ways:

- Group A, of 12 children, performed a distributed workout on 6 consecutive days (Monday to Saturday), making 40 throws for each child at daily (for a total of 240 weekly throws for child.
- Group B, of 12 children, performed a concentrated workout in 3 consecutive days (Wednesday, Thursday, Friday), making 80 daily throws for each child (total of 240 weekly throws for each child).

Participants

The survey was conducted on a sample of 24 young male athletes who had not practice basketball, of ages of 10 and 12 years. They have voluntarily participated in the study. The sample was divided into two groups of 12 children, one experimental group (A) and one experimental group (B) and been assigned them a new motor task to learn the free throw ability, carried out from regulatory line of the free throw. Nobody child had previously performed sport activities concerning to the motor task of the research. Participants were initiated to learn the new motor task (free throws), however using different ways of distributing the practice, with the aim of assessing whether and to what extent a different methodological approach (intensive and extensive method) is able to influence the learning of a new motor skill. In the tables 1 and 2 summarizes age, height and weight of the 24 children, showing that the mean age, height and weight of the two groups was similar.

Table 1. Physical characteristics (Mean and SD).

	Group A (n=12)		**Group B** (n=12)	
	M	SD	M	SD
Age (year)	11.05	0.49	10.89	0.46
Height (cm.)	150.91	2.95	151.16	2.64
Weight (Kg.)	48.41	2.09	48.16	1.95

Table 2. Mean and SD of two groups.

	Experimental group A			Experimental group B		
Subject	**Age**	**Height**	**Weight**	**Age**	**Height**	**Weight**
1	10.3	147	47	10.5	148	47
2	10.5	151	49	10.3	154	46
3	10.5	156	51	10.5	152	45
4	10.8	152	52	10.4	151	50
5	10.7	150	50	10.7	155	50
6	11.4	150	51	11.3	154	51
7	11.6	152	48	11.6	150	48
8	11.2	150	47	10.6	153	47
9	10.8	148	46	10.8	148	46
10	11.4	146	45	10.9	146	49
11	11.5	154	47	11.5	151	48
12	11.9	155	48	11.6	152	51
Mean	**11.05**	**150.91**	**48.41**	**10.89**	**151.16**	**48.16**
DS	**0.49**	**2.95**	**2.09**	**0.46**	**2.64**	**1.95**

Statistical analysis

Measures of central tendency and dispersion (mean ± standard deviation) of age, height and weight of two groups: Group A; age: 11.05 ± 0.49; height: 150.91 ± 2.95; weight: 48.41 ± 2.09; Group B; age: 10.89 ± 0.46; height: 151.16 ± 2.64; weight: 48.16 ± 1.95).

Table 3. % Throws and mean for each week (group A).

	Experimental group A			
Subjects	First week	Second week	Third week	Fourth week
1	79	82	83	84
2	81	84	85	87
3	78	81	83	85
4	76	80	82	83
5	79	81	82	84
6	83	85	88	89
7	78	82	84	84
8	80	83	85	85
9	82	85	88	90
10	79	83	85	86
11	83	86	87	87
12	79	83	85	86
Throws done	957	995	1017	1030
Throws attempted	2280	2280	2280	2280
% Throws	**41.97%**	**43.64%**	**44.61%**	**45.18%**
Mean	**79.75**	**82.91**	**84.75**	**85.83**

A t-test for independent groups was conducted to check the differences between the two means of groups with relative percentages to improvement.

The analysis covered basic statistics and percentages for the date considered. All statistical analyzes were conducted using Dell's statistical software 13.2.

Table 4. % Throws and mean for each week (group B).

Experimental group B				
Subjects	First week	Second week	Third week	Fourth week
1	77	78	79	81
2	80	82	84	83
3	83	84	85	85
4	80	82	83	84
5	86	85	86	86
6	88	88	89	89
7	83	84	85	85
8	78	80	82	82
9	78	79	80	80
10	75	78	79	79
11	76	77	78	80
12	84	84	83	85
Throws done	968	981	993	999
Throws attempted	2280	2280	2280	2280
% Throws	**42.46%**	**43.03%**	**43.55%**	**43.82%**
Mean	**80.66**	**81.75**	**82.75**	**83.25**

Table 5. T-test groups A and B (treatment initial-final).

t-test groups A and B (treatment initial-final)		
t-test	First week	Fourth week
p-value	0.257431	0.019094337
	No significant	Significant
	Level significant α=0.05	

RESULTS

A t-test for independent groups (Table 5) was conducted to evaluate any significant differences between the experimental sample A and the experimental sample B after the first week in relation to the performance on free throws. The results show the absence of significant differences between the two groups in exam ($p > 0.05$). A t-test for indipendent groups (table 5) was conducted then, after four weeks, between the group A and the group B, in relation to the performance on the free throws. The results indicate a significant difference between the two groups in exam ($p < 0.05$). Tables 1-2-3-4-5-6 and diagrams 1-2-3 summarize the results obtained in the present study. The children of Group A obtained a number of successes (free throws done) significantly higher than those of group B; even though initially group B done more than 968 free throws compared to 957 done by group A (Diagr.1). Apart the first training week, Group A had a steady increase in learning over the four weeks. Significant differences were observed at the end of training for the two groups (Table 5) with a percentage increase of group A in learning of 8.53%, while Group B obtained an increase of 3.21 with a difference of 5.23% between the two groups (Diagr.2). In diagr.1 shows the number of free throws done by group A and group B in the expected four weeks of training. As can be seen, Group A shows a progressive improvement in performance; while Group B has slight improvements between the start and end of training, less obvious than Group A. Again for Group B, the values differ significantly in the last week (slight stabilisation). Finally, the estimation of the training effect due to the type of method used (intensive and extensive) for the two groups: group A has obtained a increase of 8.53% and Group B of 3.21% (Diag. 2); while the percentage difference between the two groups is been of 5.23% (Table 6).

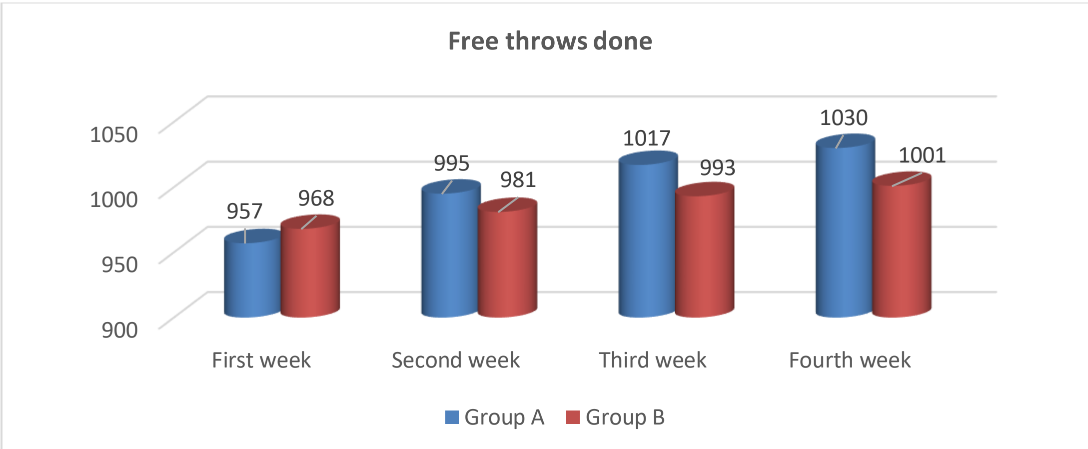

Figure 1. Differences between two groups for throws done.

Table 6. % Estimating of training effect in the two groups.

Estimating of training effect	
Group A	**Group B**
MD = 85.8-79.7 = 6.08	MD = 83,2-80,6 = 2,59
% increas.=(MD/79.7)*100	% increas.=(MD/80,6)*100
% increas.=(6.08/79.7)*100	% increas.=(2,59/80,6)*100
% increasement = 8.53 %	% increasement = 3,21%
Difference % between two groups=8.53 - 3.21= 5.23%	

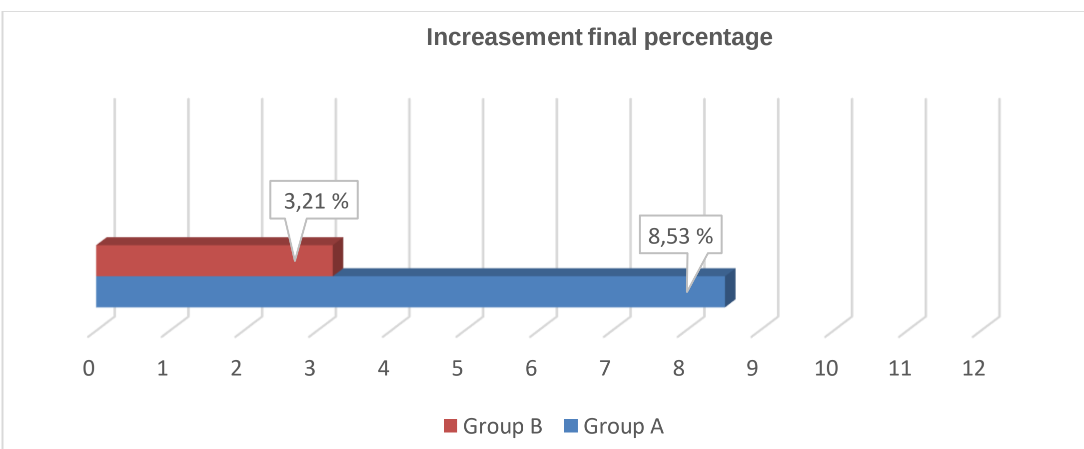

Figure 2. Increasement final percentage between two groups.

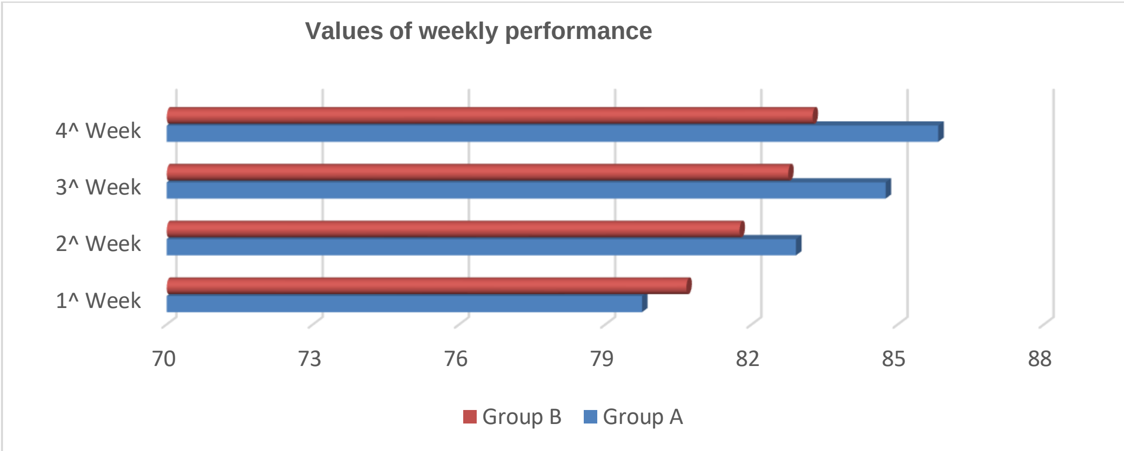

Figure 3. Values for each week performance between two groups.

DISCUSSION

The results of the present study reveal less advantageous improvements, using intensive training (group B), compared to the one performed with extensive training (group A). A practice distributed and extensive over time but constant involves undoubtedly significant advantages. For every learning process, where there is a new motor task and its stabilization, constant repetition is indispensable. In fact, just repeating a motor task learns it, but it is also true that there are other factors that affect the success of a learning process such as motivation, teacher / coach-student / player ratio, initial capacity / skills and above all the number of repetitions and the methodology to use. The results obtained, using a sample of 24 children aged between 10 and 12 (24 males), allow some considerations. The four training sessions concentrated in 3 consecutive days were sufficient to get slight improvements in learning a new motor task; however, the improvement observed in training sessions of 6 days is been more significant. It can then be concluded that, to learn a new motor task in a stable manner, the workout must be continued for a certain period of time and provide for a high number of repetitions.

CONCLUSIONS

Improving and perfect a learning is the main purpose of any teaching, both for motor and cognitive learning. The results show how the role of the distribution of the practice, for the formation of effective and consolidated motor learning, is based on careful timing distribution of training sessions and on a large number of repetitions in order to achieve great precision and a high level of performance. And it is in this view that the results of the present study should be read, the children who utilized a concentrating the practice in 3 consecutive days (group B), although showing a discreet level of initial successes (first week) compared to group A, at term of the training period (4 weeks) showed a slight improvement, resulting in a rise of only 3.21% at the end of the training period. The results of group A, with a frequency of distributed workouts on six consecutive days, showed a higher improvement than group B, resulting in a significant percentage increase of the 8.53% at the end of the four weeks of training. Finally, and in line with the data of the present study, the extensive method and a high repetition number are recognized as a determining factor for the acquisition of a new motor skills. Coaches and anyone involved in training of young player should account for these methodological indications with the aim of program a technical-tactical training specific.

Probably the theoretical basis of motor learning is in the different approach to teach: cognitive approach and ecological dynamic one (Guetano et al., 2015). Specifically, the heuristic learning underlines in the Freedom degrees theory (Bernstein, 1967) and motor imagery theory (Jeanneroad, 2010) both of them are the neurophysiological evidence in mirror neurons discovery (Rizzolatti, Fogassi,2017, Rizzolatti, Rozzi, 2016).

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